# Training a Deep Feedforward Network

## Forward pass and Backpropagation

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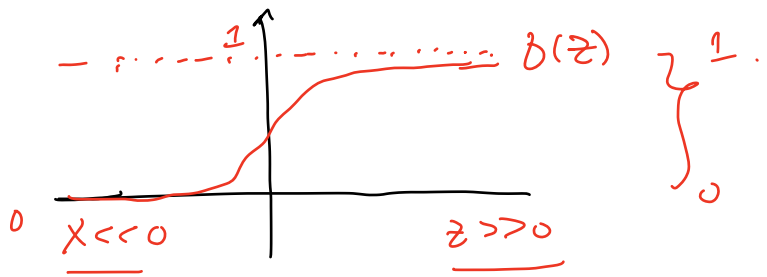
See Powerpoint slides.

# Practical issues

$$a = \frac{1}{1+e^{-z}}$$




## Which activation function to use?

- *sigmoid* function $\sigma(z)$: gradient $\nabla f(z)$ **saturates** when $z$ is highly positive or highly negative. Not suitable for hidden unit activation.
  ↳ good for some output activation

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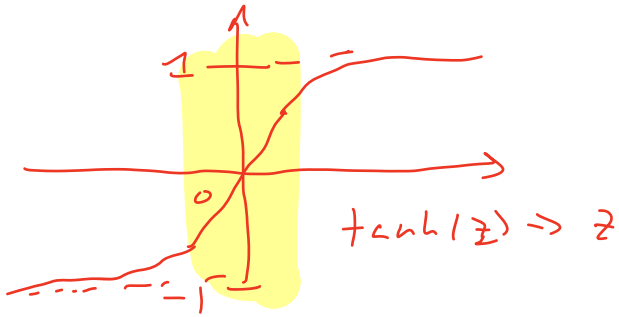

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- *ReLu*$(z)$: easy to optimize (6 times faster than sigmoid), often used with affine transformation $g(W^T x + b)$. *Derivative is 1 whenever the unit is active.*


**Sigmoidal activation functions** *are often preferred than* **piecewise linear activation functions** *in non-feed forward networks. e.g. probabilistic models, RNNs etc*

# Additional resources

Deep neural network is a relative young field with lots of empirical results. Read more on the practical things to do for building and training neural networks:

- Stanford Class on Convolutional Neural Networks: `http://cs231n.github.io`
- Ian Goodfellow, Yoshua Bengio and Aaron Courville, *Deep Learning*, MIT Press, 2016

Demos:

- `http://vision.stanford.edu/teaching/cs231n-demos/linear-classify/`
- `https://playground.tensorflow.org/`